

# Health Consultation

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SENTINEL WOOD TREATING COMPANY INCORPORATED

AVA, DOUGLAS COUNTY, MISSOURI

EPA FACILITY ID: MOD029684438

APRIL 27, 2004

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

## **Health Consultation: A Note of Explanation**

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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## HEALTH CONSULTATION

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AVA, DOUGLAS COUNTY, MISSOURI

EPA FACILITY ID: MOD029684438

Prepared by:

Missouri Department of Health and Senior Services  
Division of Environmental Health and Communicable Disease Prevention  
Section for Environmental Public Health  
Under a Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry

## STATEMENT OF ISSUES AND BACKGROUND

### Statement of Issues

The Environmental Protection Agency (EPA), through the Agency for Toxic Substances and Disease Registry (ATSDR) regional office, has requested the Missouri Department of Health and Senior Services (DHSS) to complete a health consultation for the Sentinel Wood Treating, Incorporated (Sentinel) site. This health consultation will examine contaminant concentrations and exposure levels at the site and evaluate the corresponding threat to public health.

### Background

The Sentinel site is located in Ava, Douglas County, Missouri, approximately 55 miles southeast of Springfield, Missouri. Ava is a small town with an approximate population of 2,398. The street address for the site is 412 NW 12<sup>th</sup> Avenue in Ava. The site is on the north side of NW 12<sup>th</sup> Avenue, which is also known as State Route 14 and Business Highway 5 (See Figure 1). The site is approximately 15 acres in size and is located in a mixed industrial, commercial, agricultural, and residential area of the city. Several commercial establishments have been developed on the site and in the surrounding area (1).

The Sentinel Wood Treating facility operated at this site. The facility pressure treated wood with pentachlorophenol (PCP) from 1959 until approximately 1978. The resulting sludge from the wood treating process was either burned on-site in a boiler or deposited in one of three lagoons. The lagoons are located on the northern edge of the site and were closed in 1978-1979 when the pressure treating wood operations ceased at the facility (1). This area is referred to as the former lagoon area. The former lagoon area is secured from the rest of the site with barbed wire fencing and gates that are kept locked.

The company began manufacturing hog houses in 1975 and portable and/or outdoor wood furniture in 1980. The hog houses and furniture were constructed with CCA- (copper, chromium, and arsenic) treated lumber. Lumber was not CCA-treated on-site; however, the sawdust and scrap wood from construction was burned in an on-site industrial furnace. In the late 1980s, all operations ceased at the site. Sentinel Industries sold 12 acres of the property, excluding the three acres where the lagoons are located. In December 1995, Sentinel Industries repurchased the 12 acres and assumed sole ownership of the site (1).

Two retail stores are on the southern portion of the site and face Highway 14. The Curtis Department Store is in the south portion of the southernmost building on-site. The Dollar General Store occupies the building east of the department store. There is a cabinet making shop located on-site in the northeastern most building (2). Other structures on-site are used for storage of equipment, furniture and other items (2). Figure 2 is a detailed sketch of the Sentinel site.

Contact with the site is limited to delivery personnel, store personnel, and the renters of the remaining buildings. The retail store parking lots are paved with asphalt. The customers and store personnel do not come into contact with contaminated soils. The cabinetmaker and maintenance person are on-site daily. Most of their time on-site is spent in a vehicle or building. Contact with the contaminated subsurface soils is not anticipated.

Two unnamed streams come together at the northern edge of the site. The resulting stream flows across the property, under the highway through first a sparsely populated residential area, then a city park and ultimately into Prairie Creek. Reportedly, no private wells are in use within the city limits and all residents within a mile of the site are on city water (1).

The properties north of the Sentinel site are private farms used for pastureland. Two ponds were located immediately north of the site. The ponds were drained in order for a new road to be constructed through this area.

## **Site Investigations**

Numerous investigations have occurred at the site and the surrounding area. The results of the investigations have been used to determine the nature and extent of contamination at the site, to evaluate the associated risk to public health, and to help select remedial alternatives.

In 1984, the Missouri Department of Natural Resources (MDNR) conducted a Preliminary Assessment of the site. The report discussed the visual observations of the assessor. In January 1993, a focused Site Inspection was performed to gather and analyze environmental samples, to investigate exposure to hazardous substances and to test the theory that hazardous materials were buried on-site. Samples were obtained from subsurface lagoon material, sediment from the stream running through the site, the nearest municipal well, and background samples (1). In June 1997, a Removal Assessment was conducted to locate contamination in surface soil, surface water or sediment. Samples were taken from surface and subsurface soil, sediment, bulk waste, surface water, and groundwater.

The Missouri Department of Health and Senior Services prepared a Health Consultation in May 1998, which discussed the contamination and risk at the site (1). The Health Consultation concluded that the subsurface soil at the site is contaminated with PCP and dioxins at levels of health concern. Dioxins are presented in this Health Consult as 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxic equivalents (TEQs) and will be referred to hereafter as dioxin. At that time, the public water supply did not seem to be affected by site contaminants at levels of health concern. However, it was concluded that PCP-contaminated subsurface soil could lead to future groundwater contamination because groundwater can absorb and transport contaminants or contaminated soil particles as it flows through areas with contaminated subsurface soil. The surface soil had limited testing for metals and dioxin. This limited sampling indicated arsenic and dioxin present at levels of health concern. Inhalation exposure could occur from on-site dust and dust migrating off-site. Without additional surface soil testing, further conclusions could not be made concerning the full impact on public health. In a surface water sample taken off-site in the unnamed tributary, PCP was detected at a concentration below a level of health concern. Thus it appeared that the surface water had not been affected at a level of health concern by site contaminants at that time.

In July 2000, the EPA asked the Ecology and Environment, Inc, Superfund Technical Assessment and Response Team (START) to conduct a Removal Assessment/Brownfields Targeted Assessment at the Sentinel site. Samples were taken of the surface and subsurface soil, ground and surface water, and sediment.

Soil sample results indicated that PCP and dioxin were present on-site in subsurface soils both within and outside the former lagoon area. In both areas, PCP and dioxin were at levels that exceeded ATSDR's acceptable soil comparison values of 700 milligrams per kilogram (mg/kg)

and 1 microgram per kilogram (ug/kg), respectively. PCP was found in levels as high as 9,900 mg/kg and dioxin was as high as 48.55 ug/kg. The assessment confirmed the presence of elevated levels of PCP, dioxin, and polycyclic aromatic hydrocarbons (PAHs) in the soil and seep from the former lagoon area. Elevated concentrations of arsenic were found in the surface soil in the area of the former industrial furnace. PCP and dioxin levels in the groundwater exceeded the EPA's Maximum Contaminant Level (MCL) (3). A MCL is the maximum concentration of a chemical allowed by the EPA in public drinking water.

The sampling conducted at the Sentinel site also documented high levels of PCP and dioxin in the subsurface soil in the former lagoon area. Over half of the 42 samples collected in the former lagoon area had PCP levels above all applicable health benchmarks. Over time, the lagoon waste material has begun to seep to the surface in three locations. The seep material contains high levels of PCP (up to 46,000 mg/kg) and dioxin (up to 13.26 ug/kg) (2). At the time of the samplings, the MDNR CALM value for the seep material was 22 mg/kg for PCP and 5 ug/kg for dioxin.

In September 2001, the EPA, MDNR and Sentinel Industries signed an Administrative Order on Consent. This order required Sentinel to conduct a response action to address the contamination at this site. The response action included securing the site and conducting additional assessment activities to further characterize the wood treating contamination sources and activating the on-site ground water diversion system. The purpose of the diversion system was to pump the contaminated ground water, treat it, and discharge the treated water into the on-site stream.

In September 2002, the MDNR released an Expanded Site Inspection Report outlining the results of sampling activities conducted from October 2000 through May 2001. This report outlined the source areas of contamination and the effect on groundwater, surface water, soil, and air.

Levels of PCP (1,200 mg/kg) and dioxin (16.2 ug/kg) found in the subsurface soil in the former wood treatment area exceeded ATSDR's acceptable soil comparison values of 700 mg/kg and 1 ug/kg, respectively (Table 1). Elevated levels of arsenic were found in the surface soil in the former furniture factory building area. The average arsenic concentration in the samples taken was 21.1 mg/kg with the highest value being 108.0 mg/kg (2). The Cleanup Level for Missouri (CALM) value for arsenic in industrial soil is 14 mg/kg.

Because access to the site is limited, the MDNR report estimated that the exposure potential to contaminated soil on-site is low. The majority of the wastes on-site in the former lagoon and wood treatment areas are in the subsurface. The surface seeps in the former lagoon area are covered with corrugated metal sheets and cinder blocks to prevent exposure. The former lagoon area is also secured from the rest of the site with barbed wire fencing and gates that are kept locked. There are signs posted with warnings of "Keep Out" (2).

Testing of the surrounding monitoring, municipal, and private wells was conducted to monitor the groundwater. PCP had been detected in the two of the city's municipal wells at levels of less than 0.5 ug/L in February 2001 and December 2001. However, none was detected in any of the municipal wells during two subsequent rounds of quarterly monitoring. The city of Ava's municipal wells are located within one mile of the site. There are also over 200 private wells within four miles of the site. The nature of the geology in the area is complex given the karst topography, therefore it is difficult to predict groundwater contamination or draw conclusions regarding the one-time detections of PCP in the municipal wells (2). Groundwater samples taken

from monitoring wells south of 12<sup>th</sup> Avenue contained levels of PCP of 0.2 and 0.06 ug/L at this time.

The stream that converges on the Sentinel site and runs through the City of Ava has been monitored at several locations. The surface water samples showed PCP on-site and up to a mile downstream. On-site, downstream of the former lagoon area, PCP was measured at 7.7 ug/L in 2001. EPA's Maximum Contaminant Level (MCL) for PCP is 1.0 ug/L. Downstream of the site, on private properties south of 12<sup>th</sup> Avenue, PCP was measured at 240 ug/L and 8.1 ug/L in surface water. Sediment samples along the stream had trace amounts of PCP in further downstream locations.

In early 2003, the EPA asked Tetra Tech EM Inc. (Tetra Tech) to assess potential sediment contamination off-site in the stream near the Sentinel site. Next, EPA asked Tetra Tech to determine whether the contaminants associated with the Sentinel site have impacted the stream. EPA's Region 7 Superfund Division, under the START, previously sampled the stream in April 2002 as part of a Removal Site Evaluation.

Tetra Tech began their sediment sampling activities on August 6, 2003. Samples were collected starting at the most downstream location and progressed upstream toward the Sentinel site. The sampling results confirm that the Sentinel site appears to be a potential source contamination in the stream. Two ponds located immediately north of the Sentinel site were drained to allow for construction of a new road in the fall of 2002. According to witnesses, the release of water from the ponds caused the stream to overflow its bank, potentially flushing contaminants downstream. However, the concentrations of the contaminants in the sediment in the unnamed tributary were actually lower than the previous sampling performed in 2002, indicating that draining the ponds did not further impact the stream (4). Table 1 is a listing of the PAH levels found in the 2003 sampling.

## DISCUSSION

### **Soil:**

At the Sentinel Wood Treating site, two areas are considered to be the primary source areas of contamination in soil, the former treatment area and the former lagoon area.

In the former lagoon area, the subsurface soil is contaminated with PCP at levels above the ATSDR's Environmental Media Evaluation Guide (EMEG). ATSDR has developed EMEGs as guidelines to determine if there is a need to further investigate exposure to a chemical for its possible health effects. Levels below the EMEG are unlikely to pose a health threat. Exposure to the contaminants in the former lagoon area is unlikely since access is limited, the seep material is covered and the majority of the contaminants are in the subsurface soil.

Levels of PCP and dioxin below health concern were found in the subsurface soil in the area surrounding the former treatment area. Low levels were also found in the surface soil in the area of the roadway and the former furniture factory building. The elevated levels of PAH's were found in the soil and sludge in the former treatment area. The highest levels of PAH's were found in the former lagoon area.

Arsenic was found in the surface soil on-site in the former furniture factory building area. Most of the levels detected were elevated above background levels but below EPA's Preliminary Remediation Goals acceptable value for industrial exposure. Since contact with the site is very limited, direct exposure to elevated levels of arsenic is not expected to occur. Proper precautions should be taken not to disturb the soil through activities like digging, drilling, or tilling.

Potential risk to the employees who work on-site is considered low because they do not come in contact with the contaminated soil. The major concern is the migration of contaminants into the groundwater and surface water and the disturbance of subsurface soils.

**Water:**

Low levels of PCP were detected in private and public wells that were below the MCL. These levels did not raise health concerns and PCP has not been detected since December 2001.

There is no known contact with the surface water on-site. Although the unnamed tributary to Prairie Creek is a gaining and losing stream, there is no evidence indicating that it is or is not contributing to drinking water further downstream. The potential exposure risk to citizens, especially children, who come into contact with the stream off-site will be addressed in a separate Health Consultation.

## CONCLUSIONS

Based on the available data and current site conditions, the Sentinel site has been classified as No Apparent Public Health Hazard. The majority of the contamination at this site is in the subsurface soil and there is very limited contact with the soil on-site. The No Apparent Public Health Hazard category is used for sites where human exposure to contaminants is occurring or has occurred in the past, but the exposure is below a level of health hazard. If site use changes in the future, the DHSS may need to re-evaluate the hazard classification. The classification for current use is based on the following conclusions:

1. Existing evidence indicates that exposure is not presently occurring, but could potentially occur in the future, depending on the future use of the site.
2. The Sentinel site has subsurface soil contamination of PCP and dioxin at levels above health concern. However, current exposure to contaminated material is unlikely because the material is below ground and access to the site is limited. The major concern at the site is the possible contamination of the groundwater or surface water, and migration of the contaminants off-site.
3. The Sentinel site has surface soil contamination of arsenic, dioxin, and PAHs. Currently, exposure to these contaminants is unlikely due to the limited access of the site. However, use of the site changes in the future, soil disturbance and dust migration may need to be re-evaluated.

## **RECOMMENDATIONS**

1. Based upon current information, removal actions, by EPA or Sentinel, are justified to address the contamination in the former lagoon and treatment areas. Although current exposure is limited, future exposure is variable depending on the use of the site and the disturbance of soil. It is important to control the release of contaminants into the groundwater and surface water.
2. Remedial activities including soil removal and treatment should be conducted by EPA or Sentinel to ensure that further migration of contaminants off-site does not occur.
3. On-site soil disturbances (e.g., digging) should be restricted until remediation activities are complete. Any person involved in further sampling or remediation at this site should wear the appropriate protective equipment to prevent exposure to the contaminants.
4. Continue to monitor the public and private water wells in order to track the presence of contaminants and ensure levels do not exceed any MCLs.
5. Maintain site security to prevent access to the site.

## **PUBLIC HEALTH ACTION PLAN**

This Public Health Action Plan (PHAP) for the Sentinel site contains an explanation of actions to be taken by the Missouri Department of Health and Senior Services (DHSS), the Agency for Toxic Substance and Disease Registry (ATSDR) and other stakeholders. The purpose of the PHAP is to ensure that this public health consultation not only identifies public health hazards, but provides an action plan to mitigate and prevent adverse human health effects resulting from past, present, and future exposures to hazardous substances at or near the site. Below is a list of commitments of public health actions to be implemented by DHSS, ATSDR, or other stakeholders at the site:

1. DHSS/ATSDR will coordinate with MDNR/EPA and Sentinel to implement the recommendations in this health consultation to eliminate or reduce exposure to the contaminants.
2. DHSS/ATSDR will review additional sampling data as it becomes available and provide guidance regarding possible health risk.
3. DHSS/ATSDR will continue to address community health concerns and questions as needed and provide necessary community and health professional education.
4. DHSS/ATSDR will update this public health consultation as more information becomes available.

**Preparers of the Report:**

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**Attachments:**

- Figure 1, Ava, Missouri Map with Sentinel Site location (2)
- Figure 2, Sentinel Wood Treating Site Map (2)
- Table 1, Select Sampling Results from Sentinel Wood Treating Site

## **Certification**

This health consultation for the Sentinel Wood Treating Company Site was prepared by the Missouri Department of Health and Senior Services under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved methodology and procedures at the time the health consultation was initiated.

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Technical Project Officer, CAT, SPAB, DHAC

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.

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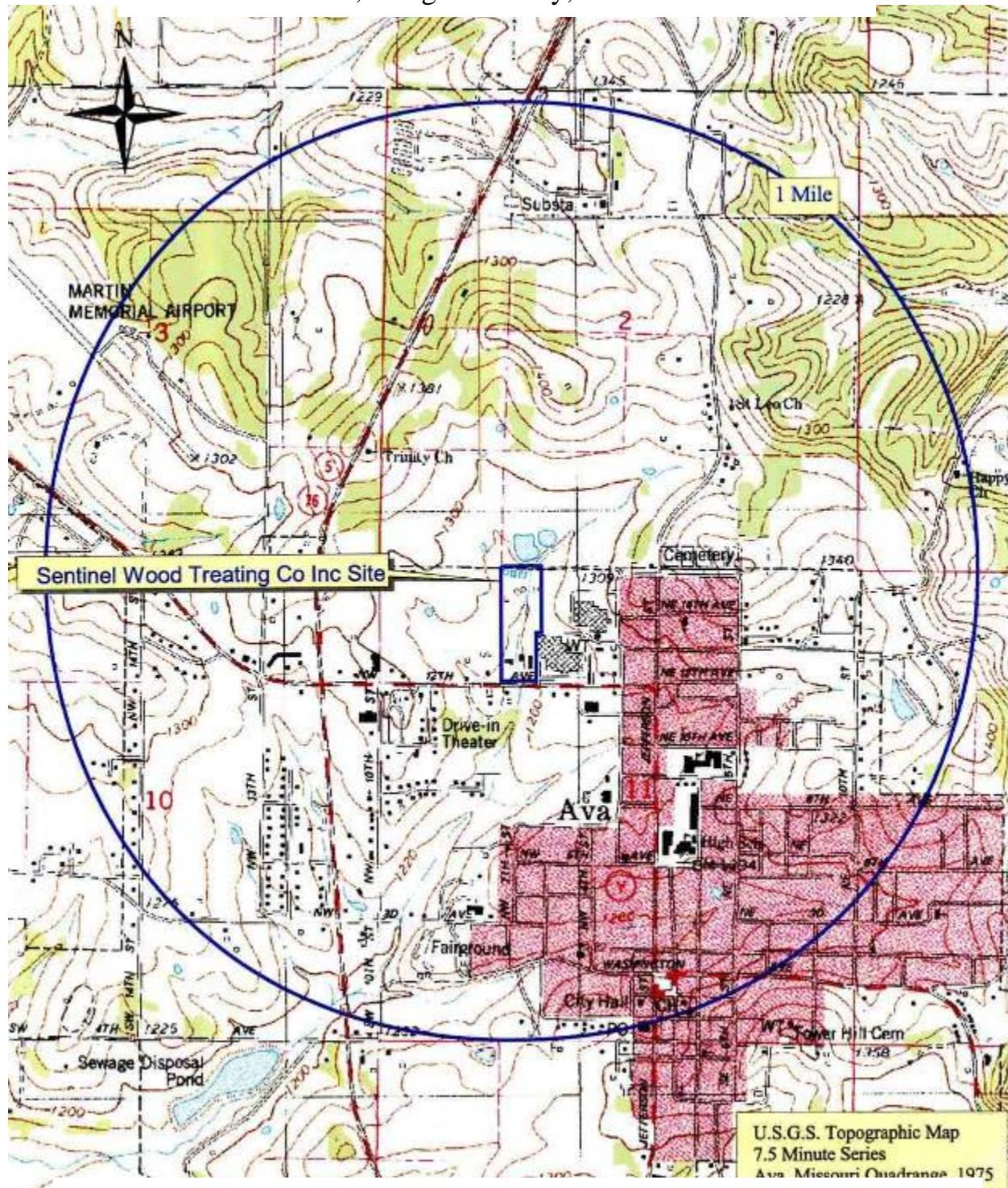
Team Lead, CAT, SPAB, DHAC, ATSDR

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1. Missouri Department of Health and Senior Services. Health Consultation. 420 NW 2<sup>th</sup> Avenue. Sentinel Wood Treating Company Incorporated. 1998 May 19.
2. Missouri Department of Natural Resources. Expanded Site Inspection Report, Sentinel Wood Treating Co Inc Site, Douglas County, Missouri. 2002 September 9.
3. Ecology and Environment, Inc. Removal Assessment for The Sentinel Wood Treating Company Site, Ava, Missouri. 2000 December.
4. Tetra Tech EM Inc. Data Summary for Removal Site Evaluation Follow-up Sediment Sampling Activities at the Sentinel Wood Treaters Site – Ava, Missouri. 2003 December 5.
5. Agency for Toxic Substances and Disease Registry. Toxicological profile for arsenic, update. Atlanta: US Department of Health and Human Services; 2000 September.
6. Agency for Toxic Substances and Disease Registry. Toxicological profile for pentachlorophenol, update. Atlanta: US Department of Health and Human Services; 2001 September.
7. Agency for Toxic Substances and Disease Registry. Toxicological Profile for polycyclic aromatic hydrocarbons, update. Atlanta: US Department of Health and Human Services; 1995 August.
8. Agency for Toxic Substances and Disease Registry. Toxicological profile for chlorinated dibenzo-p-dioxins, update. Atlanta: US Department of Health and Human Services; 1998 December.

**Figure 1**

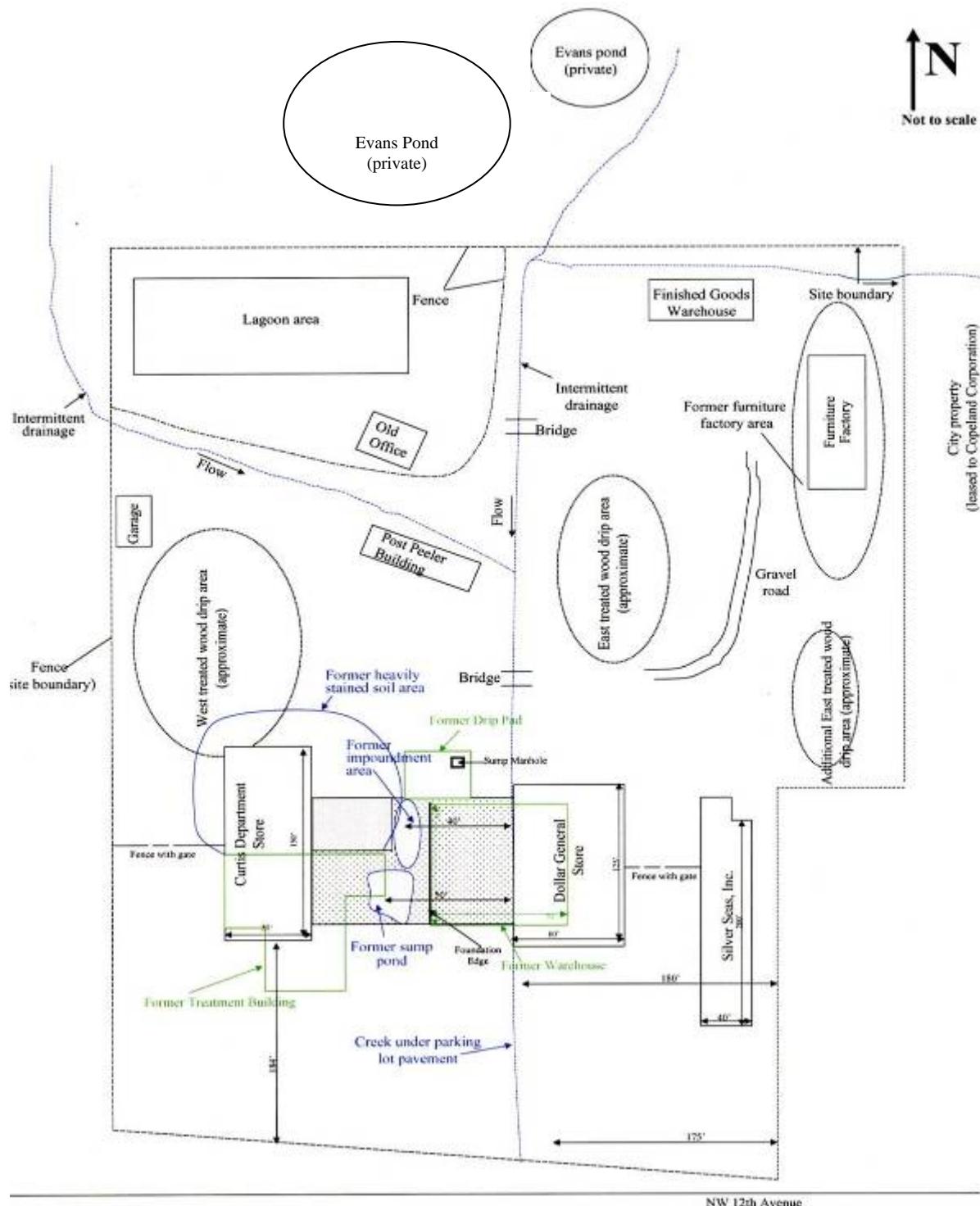
**Sentinel Wood Treating, Inc. Site Location Map**  
**Ava, Douglas County, Missouri**



Source: Missouri Department of Natural Resources, Sentinel Wood Treating Co, Inc Site, Douglas County, Missouri. 2000  
September 9.

## Figure 2

### Sentinel Wood Treating, Inc Site Map



**Source:** Missouri Department of Natural Resources, Expanded Site Inspection Report, Sentinel Wood Treating Site, Douglas County, Missouri . 2000 September 9

**Table 1**

**Select Sampling Results from Sentinel Wood Treating Site**

Contaminant	Media	Maximum Detected Value*	Health Comparison** or CALM Value
Arsenic (4)	Surface Soil	<b>108 mg/kg</b>	14 mg/kg***
Pentachlorophenol (4)	Surface Soil	0.00000065 mg/kg	700 mg/kg**
Benzo(a)anthracene (3)	Soil (lagoon area)	4,100 ug/kg	NA
Benzo(b)fluoranthene (3)	Soil (lagoon area)	<b>30,000 ug/kg</b>	3,700 ug/kg***
Benzo(a)pyrene (3)	Soil (lagoon area)	<b>42,000 ug/kg</b>	630 ug/kg***
Dibenzo(a,h)anthracene(3)	Soil (lagoon area)	<b>30,000 ug/kg</b>	570 ug/kg***
Indeno(1,2,3,cd)pyrene (3)	Soil (lagoon area)	<b>87,000 ug/kg</b>	11,000 ug/kg***
Benzo(a)anthracene (5)	Sediment	<b>3,300 ug/kg</b>	1,000 ug/kg***
Benzo(b)fluoranthene (5)	Sediment	<b>3,700 ug/kg</b>	900 ug/kg***
Benzo(a)pyrene (5)	Sediment	<b>3,500 ug/kg</b>	200 ug/kg***
Dibenzo(a,h)anthracene(5)	Sediment	<b>2000 ug/kg</b>	200 ug/kg***
Indeno(1,2,3,cd)pyrene (5)	Sediment	<b>2000 ug/kg</b>	3000 ug/kg***
Dioxin or 2,3,7,8-Tetrachlorodibenzo-p-dioxin Toxicity Equivalents (4)	Sediment	<b>2.92 ug/kg</b>	1.0 ug/kg**
Pentachlorophenol (3)	Subsurface Soil	<b>9900 mg/kg</b>	700 mg/kg**
Dioxin or 2,3,7,8-Tetrachlorodibenzo-p-dioxin Toxicity Equivalents (3)	Subsurface Soil	<b>48.55 ug/kg</b>	1 ug/kg**
Pentachlorophenol (4)	Seep Material	<b>46,000 mg/kg</b>	22 mg/kg***
Dioxin or 2,3,7,8-Tetrachlorodibenzo-p-dioxin Toxicity Equivalents (4)	Seep Material	<b>13.26 ug/kg</b>	5 ug/kg***
Benzo(a)anthracene (3)	Seep Material	160,000 ug/kg	NA
Benzo(b)fluoranthene (3)	Seep Material	<b>1,600,000 ug/kg</b>	3,700 ug/kg***
Benzo(a)pyrene (3)	Seep Material	<b>1,900,000 ug/kg</b>	630 ug/kg***
Dibenzo(a,h)anthracene(3)	Seep Material	<b>580,000 ug/kg</b>	570 ug/kg***
Indeno(1,2,3,cd)pyrene (3)	Seep Material	<b>1,600,000 ug/kg</b>	11,000 ug/kg***
Pentachlorophenol (4)	Surface Water	<b>240 ug/L</b>	1.0 ug/L****
2,3,7,8-Tetrachlorodibenzo-p-dioxin Toxicity Equivalents (4)	Surface Water	0.000021 ug/L	0.00003 ug/L****
Pentachlorophenol (4)	Ground Water	0.2 ug/L	1.0 ug/L****
Dioxin or 2,3,7,8-Tetrachlorodibenzo-p-dioxin Toxicity Equivalents (4)	Ground Water	0.00000269 ug/L	0.00003 ug/L****

Concentrations in boldface exceed applicable health comparison value.

\* Due to several sampling activities, the most recent available Maximum Detected Value was used.

\*\* ATSDR soil comparison value: The soil comparison values are media-specific concentrations used to select environmental contaminants for further evaluation.

\*\*\* MDNR Cleanup Levels for Missouri (CALM) Values. CALM values are risk-based soil and groundwater cleanup levels at sites contaminated with hazardous substances. Cleanup levels are designed to be protective of human health and the environment.

\*\*\*\*MCL Value.